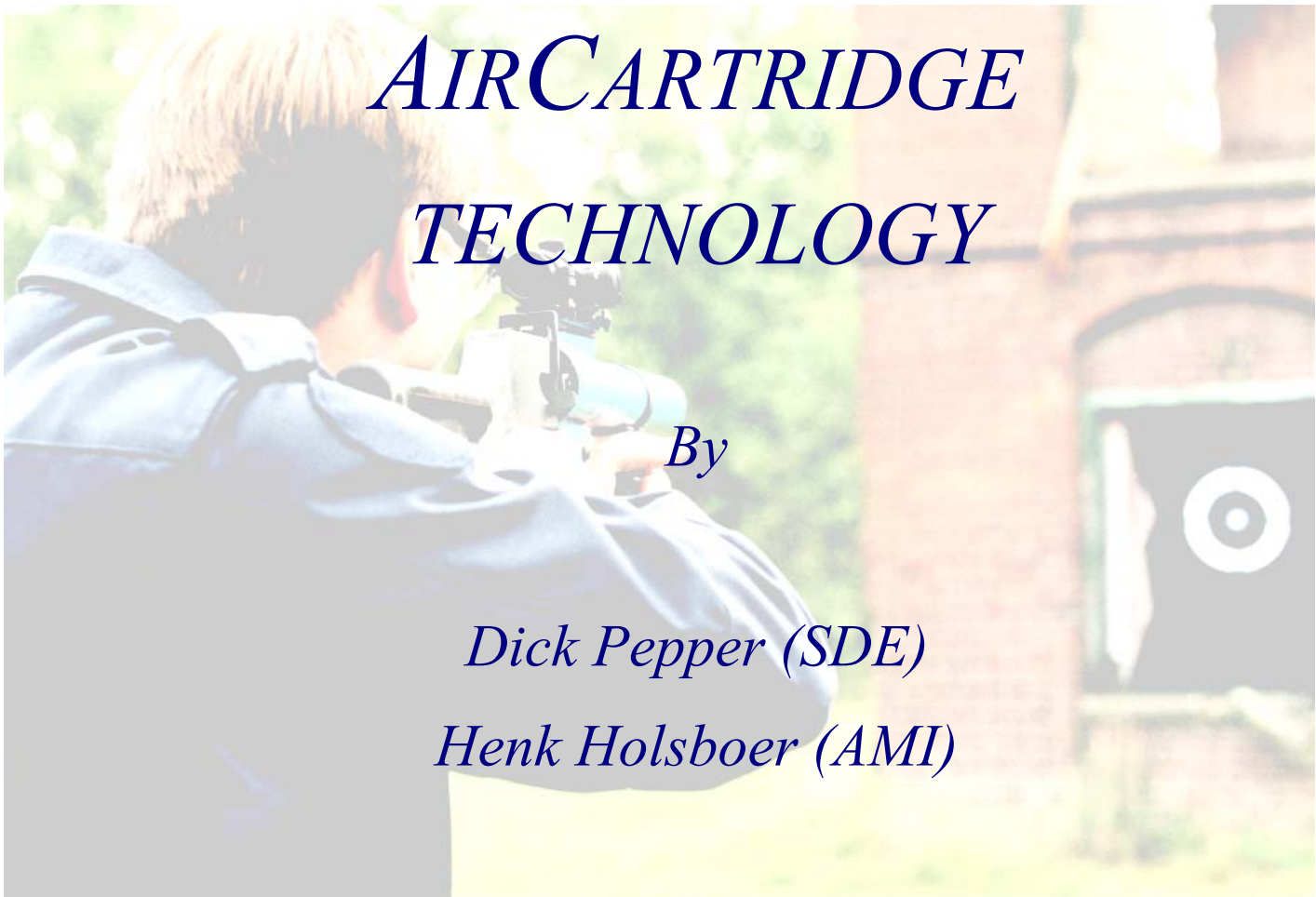
SDE



# AIRCARTRIDGE TECHNOLOGY

*By*

*Dick Pepper (SDE)*

*Henk Holsboer (AMI)*

CROWN AIRMUNITION®

# Report Documentation Page

| Report Date | Report Type | Dates Covered (from... to) |
|---|---|---|
| 13Aug2001 | N/A | - |

| | |
|---|---|
| **Title and Subtitle**<br>Aircartridge Technology | **Contract Number** |
| | **Grant Number** |
| | **Program Element Number** |
| **Author(s)**<br>Pepper, Dick; Holsboer, Henk | **Project Number** |
| | **Task Number** |
| | **Work Unit Number** |
| **Performing Organization Name(s) and Address(es)**<br>SDE | **Performing Organization Report Number** |
| **Sponsoring/Monitoring Agency Name(s) and Address(es)**<br>NDIA (National Defense Industrial Association) 211 Wilson Blvd, STE. 400 Arlington, VA 22201-3061 | **Sponsor/Monitor's Acronym(s)** |
| | **Sponsor/Monitor's Report Number(s)** |

**Distribution/Availability Statement**
Approved for public release, distribution unlimited

**Supplementary Notes**
Proceedings from the 2001 Joint Services Small Arms Symposium, Exhibition & Firing Demonstration 13-16 August 2001 Sponsored by NDIA, The original document contains color images.

**Abstract**

**Subject Terms**

| | |
|---|---|
| **Report Classification**<br>unclassified | **Classification of this page**<br>unclassified |
| **Classification of Abstract**<br>unclassified | **Limitation of Abstract**<br>UU |

**Number of Pages**
20

# *Overview*

SDE

- Who are we & where are we based?
- Airmunition concept.
- Product range & benefits.
- Energy comparison.
- AirCartridge technology & kinematic model.
  - Methodology.
  - Trials.
  - Results & Validation.
- System Modelling.
- Conclusions.

CROWN AIRMUNITION®

# *Organisation*

SDE

HEADQUARTERS
Airmunition Int B V
Netherlands

R & T
SDE
England

US Sales & Marketing
AMNA, Norcross
USA

PRODUCTION
Airmunition
Industries SA
Switzerland

CROWN AIRMUNITION®

# *Mission*

SDE

To provide safe, realistic & cost effective

weapon training systems, using the patented

concept of compressed air as an energy source.


37mm aircartridges, .38 Special and 9mm Recoil cartridges; multipurpose pellets and ManMarker Rounds.

CROWN AIRMUNITION®

# *The Concept*

SDE


AIRMUNITION®

# *Small Calibre*

SDE

CROWN AIRMUNITION®

# *Product Range*

SDE


CROWN AIRMUNITION®

# *Benefits*

SDE

- Cost Effective
  - Each cartridge can be reloaded in excess of 500/2000 times.
- Environmentally Friendly
  - Uses only air.
  - Can be used indoors without a need for ventilation.
- Safe
  - No energetic materials are used.
  - Patented vent hole in the side of the chamber.
- Reliable
- Variable Velocity
  - For special applications, the muzzle velocity can be varied by varying the pressure.

CROWN AIRMUNITION®

# *Energy Comparison 9mm*

SDE

| | Pyrotechnic Cartridge | AirCartridge |
|---|---|---|
| Maximum Pressure | 3200 (bar)<br>46,400 (psi) | 250 (bar)<br>3,625 (psi) |
| Total Energy (J) | 1840 | 9 |
| Muzzle Energy (J) | 580 | 2.5 |

CROWN AIRMUNITION®

# *AirCartridge Technology Objectives*

SDE

- To allow a wider application of the technology.
- To assist production by identifying critical areas of the design.
- To reduce development time and cost of future products.

CROWN AIRMUNITION®

# *Methodology*

SDE

- Produce a Kinematic Model of the AirCartridge.
- Conduct laboratory tests, to obtain pressure & time data within the AirCartridge, using both standard & non-standard components.
- Produce algorithms to predict the flow of air through the valves.
- Insert the data into the Kinematic Model.
- Validate the model.

CROWN AIRMUNITION®

# *Trial Programme*

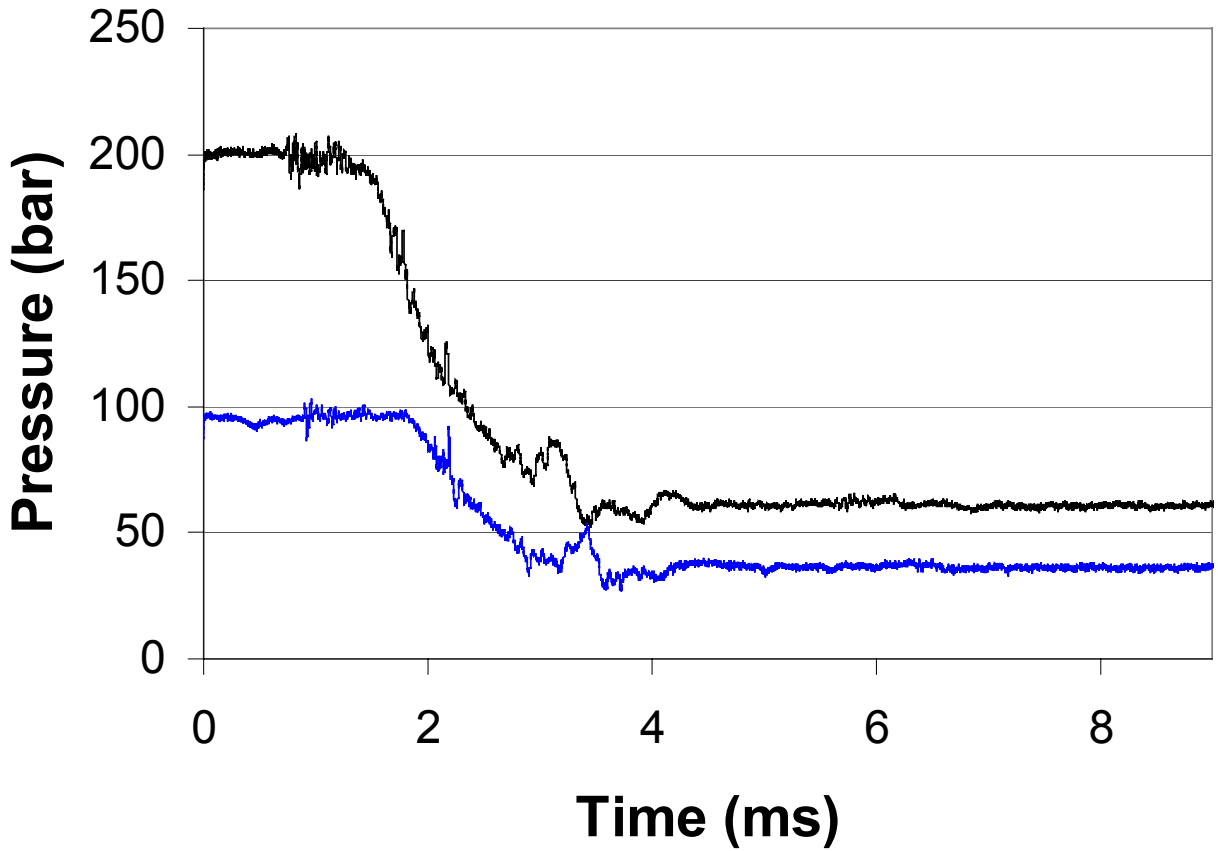
SDE

- Build Standard Variations
  - Piston (main) valve travel.
  - Flow restriction from main to rear chamber.
- Initial Charge Pressure
  - Pressures at 200 bar (2900 psi) & 100 bar (1450 psi).
- Trials
  - Determination of Spool Valve activation energy.
  - Record pressure/time data.

CROWN AIRMUNITION®

# *Trial Results*

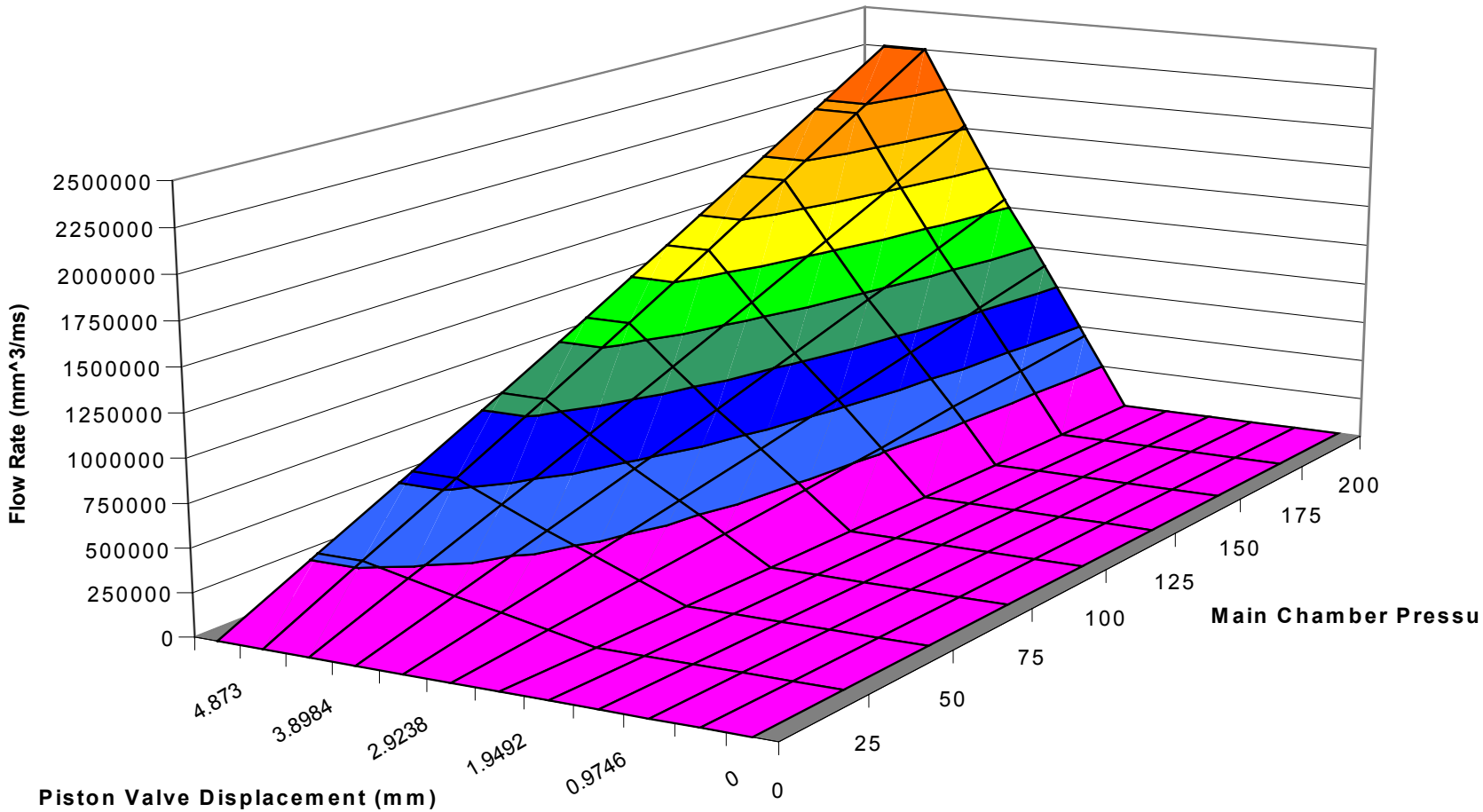
SDE




CROWN AIRMUNITION®

# Air Flow Algorithms

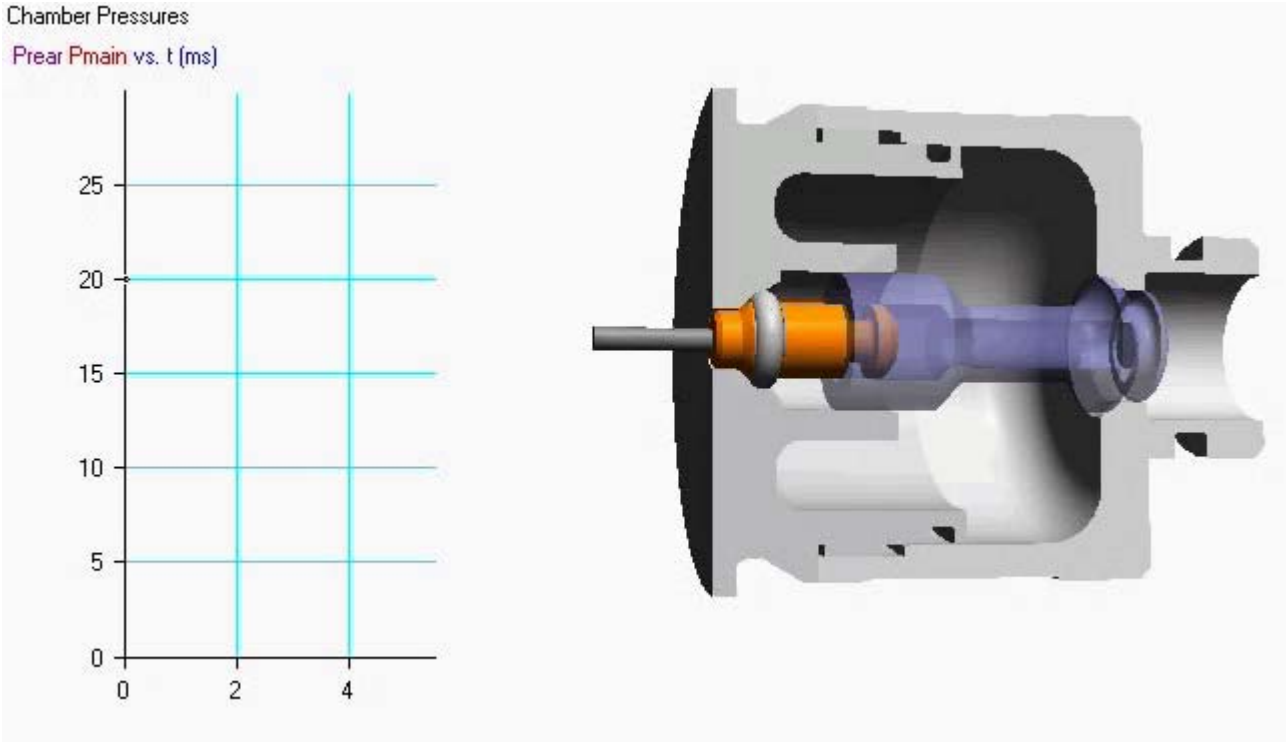
SDE




CROWN AIRMUNITION®

# *Model Results*

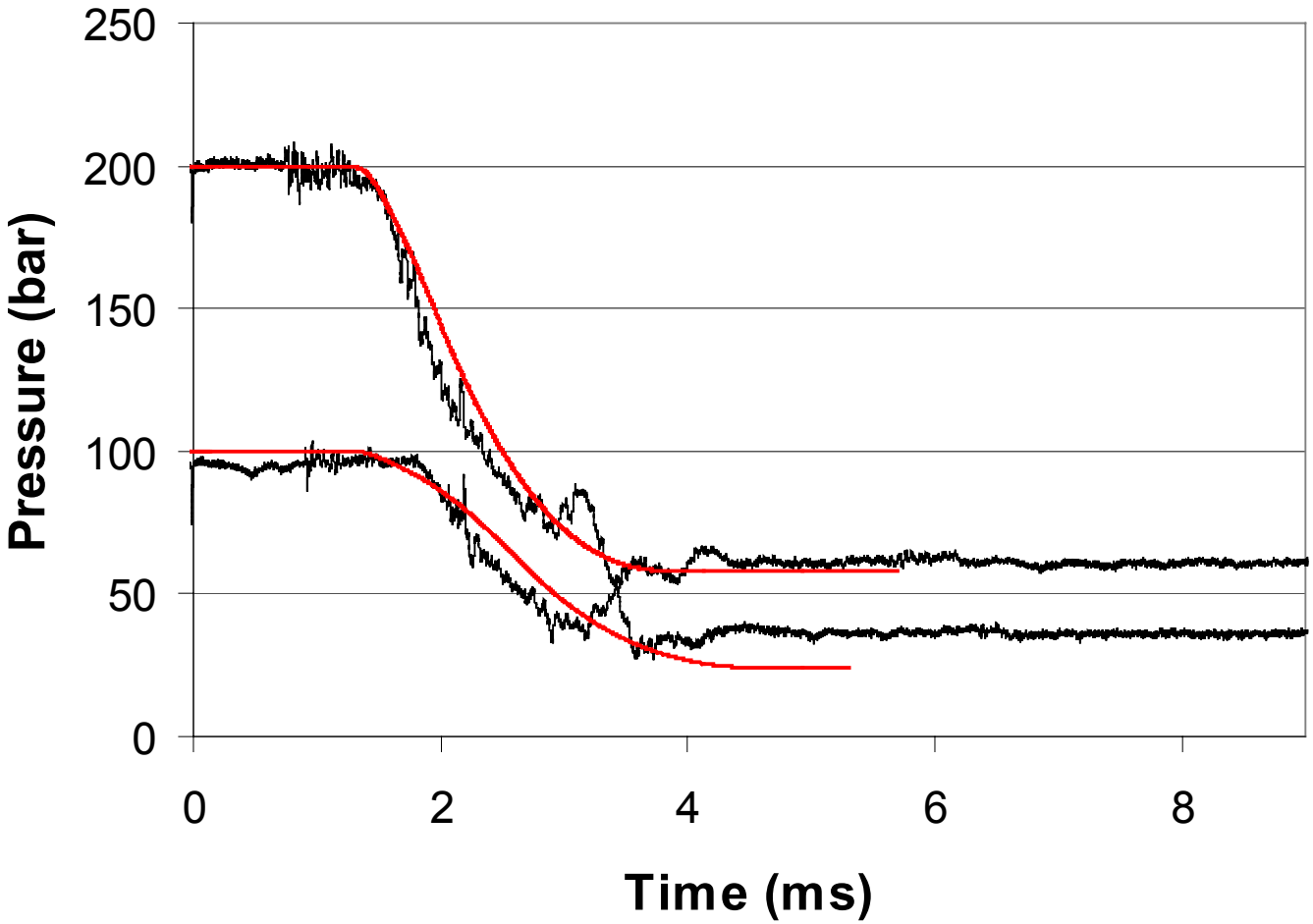
SDE




AIRMUNITION®

# *Model Results*

SDE




CROWN AIRMUNITION®

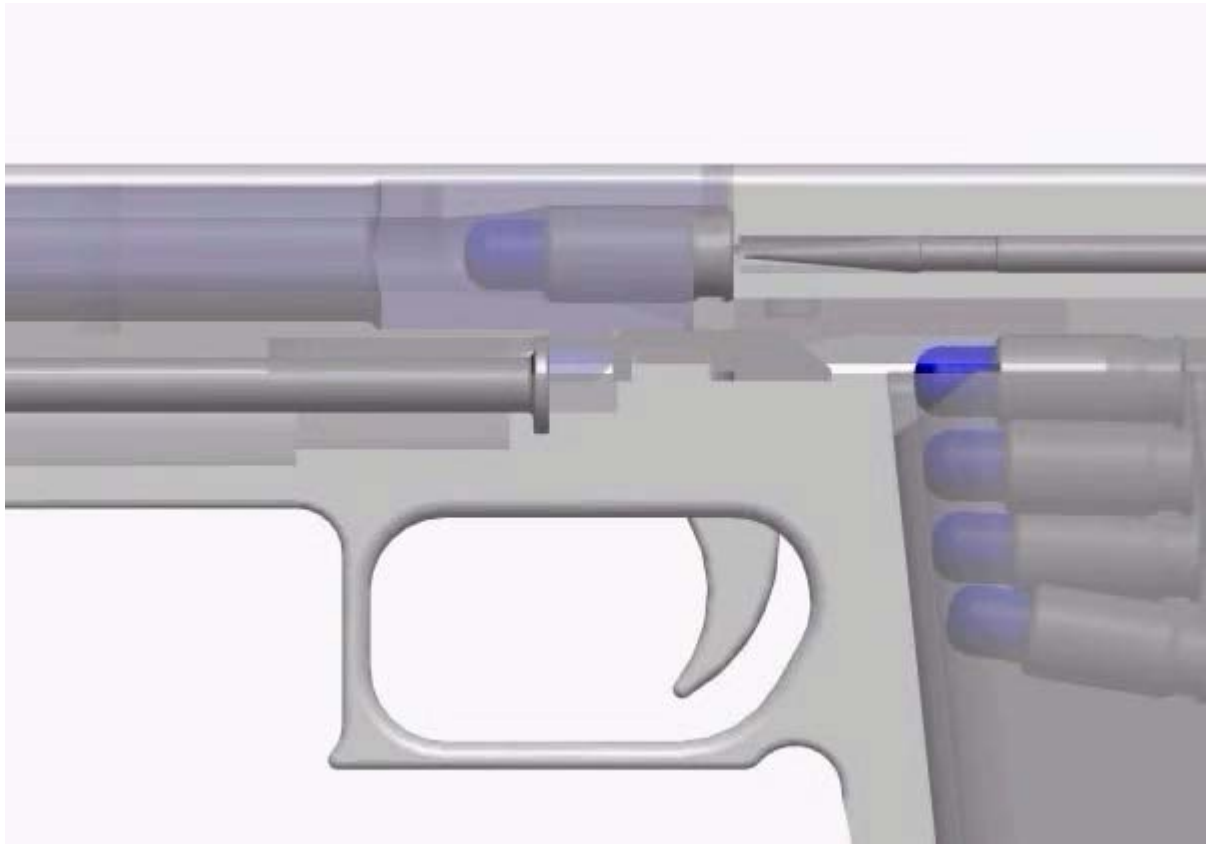
# *System Modeling*

SDE

AIRMUNITION®

# *System Modeling*

SDE



AIRMUNITION®

# *Model Conclusions*

SDE

- A Kinematic Model has been developed which accurately represents the action of the AirCartridge, which allows us to:
  - Identify & quantify critical design features.
  - Develop new products more efficiently.
- This model can be extended to include the complete weapon system, further reducing development time and costs.

CROWN AIRMUNITION®

# *QUESTIONS?*

SDE

CROWN AIRMUNITION®